but they are incapable of competition in the outside world, and require constant and skilled supervision. There is a large amount of accommodation for these patients, but, as already said, it is too small for the numbers to be found in this country. Those in charge of institutions for the feeble-minded will find a great deal of help in their management and treatment in the book by Dr. Lapage, and they will find considerable interest added to their work if they study these patients in a scientific spirit on the lines laid down by Dr. Sherlock.

ELEMENTARY MATHEMATICS.

(1) *A First Book of Geometry.* By J. V. H. Coates. Pp. xi+142. (London: Macmillan and Co., Ltd., 1911.) Price 1*s.* 6*d.*

(2) *A School Algebra.* Part ii. By H. S. Hall. Pp. vi+301–450+xxxix–l. (London: Macmillan and Co., Ltd., 1911.) Price 1*s.* 6*d.*

(3) *Theoretical Geometry for Beginners.* By C. H. Allcock. Revised and rearranged. Part i., pp. xii+125. Parts ii.–iv., pp. xii+204. (London: Macmillan and Co., Ltd., 1911.) Price, part i., 1*s.* 6*d.*; parts ii.–iv., 2*s.* 6*d.*

(4) *A New Trigonometry for Schools and Colleges.* By the Rev. J. B. Lock and J. M. Child. Pp. xii+488. (London: Macmillan and Co., Ltd., 1911.) Price 6*s.*

(5) *Solid Geometry.* By C. Godfrey, M.V.O., and A. W. Siddons. Pp. ix+109. (Cambridge University Press, 1911.) Price 1*s.* 6*d.*

(6) *Engineering Descriptive Geometry: a Treatise on Descriptive Geometry as the Basis of Mechanical Drawing, explaining Geometrically the Operations Customary in the Draughting Room.* By Commander F. W. Bartlett and Prof. T. W. Johnson. Pp. vii+159. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1910.)

(7) *Trigonometria Esférica.* By Prof. C. Wargny. Pp. 219. (Valparaiso: Talleres Tipograficos de la Armada, 1909.) Price 6 dollars.

(1) THE object of this small text-book is to give the reader a sound appreciation of the fundamental ideas of geometry, rather than a systematic knowledge of its theorems. Without doubt this is the best way of approaching the subject. As soon as an intelligent grasp is acquired of such concepts as angles, parallelism, areas, &c., it is a simple matter to take a theoretical course; but without this preliminary stage, not only is progress very slow, but the work is in itself of little educational value. Part i., which occupies one-quarter of the book, is entirely practical; part ii. contains a selection of the important theorems of Euclid, I., III., with a large quantity of numerical exercises; it is, in our opinion, unfortunate that few riders have been inserted.

(2) The second part of this book carries the reader up to the binomial theorem. A change from the customary order has been made by taking a first course of progressions immediately after quadratics. As is to be expected of so well known an author, the quality of the workmanship is excellent throughout. The explanations in the text are clear and concise, and the examples have evidently been selected with great care.

(3) In spite of the title of this book, which is a revised form of an older edition, practically no work on experimental geometry has been included. After an introduction of twelve pages on definitions, axioms, postulates, &c., the reader is at once immersed in the theoretical work. The course of theorems given agrees fairly closely with the Cambridge schedule, with a few additions. Each proposition or group of propositions is followed by a number of riders, of which only a few are numerical. We are unable to find any very novel or distinctive features in this text-book.

(4) This volume is designed for the use of candidates for scholarships at the universities, and is intended to form an introduction to the more advanced parts of Dr. Hobson's standard work on the subject. Although it assumes no previous knowledge of trigonometry, the earlier portions are scarcely sufficiently full for the novice in view of the modern idea of taking the subject at a very early stage in the school course. For introductory purposes, some such book as Mercer's "Trigonometry for Beginners" is more useful. But after this preliminary stage is covered, it is well for the student to revise this work once more in such a form as is provided by this text-book. Practical applications are fully treated, and there is an abundance of numerical and graphical work. One important change has been made in the sequence of subjects. The applications to the geometry of the triangle and quadrilateral have been deferred to the closing chapters, thus avoiding any break in the presentation of the purely analytical work. The sections on geometry are far fuller than usual, and indeed contain more than the ordinary boy is likely to require or be able to digest. This is, however, a matter for each individual teacher. We are glad to find a full treatment of the geometrical interpretation of imaginary quantities; the interest which the student takes in this kind of work and the stimulus it applies to his mind more than justify the expenditure of time involved. The general theory of infinite series and products is regarded as beyond the scope of the book, but sufficient is said to justify the validity of the use of those particular series and products met with in the course of the work. Hints for the solution of the more difficult questions are included among the answers.

(5) In spite of recent geometrical reforms, the attention paid to three-dimensional geometry is still, to say the least, inadequate. Time does not allow of a course on the lines of Euclid XI., nor would this be particularly beneficial. What is required is an informal study of the ideas and practical applications of solid geometry; and this is supplied in an excellent and brief form by the work before us. The authors have had a great deal of experience in this direction, and it is not therefore surprising that this small book should seem so admirably adapted to the purpose for which it is intended. It falls into three sections: (1) a discussion of the main properties of lines and planes; (2) the properties and mensuration of the principal solids; (3) the elements of practical solid geometry. The examples are chiefly numerical, but a sufficient

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number of riders has been included to test the student's grasp of the theory.

(6) The treatment in this volume is practical rather than mathematical, and is designed for the use of those taking a course in mechanical drawing. Elementary in character, it provides a thorough introductory account of the subject. The first chapter considers in great detail the nature and meaning of orthographic projection, using three planes of reference. Next an account is given of the projection of a straight line and the method of obtaining the true length of a line in space. After this follow successively the treatment of the intersection of planes, curved lines, and surfaces, and the traces of lines and planes with various applications, and the book closes with a description of isometric projection. The excellence of the diagrams is a feature which calls for special remark. The explanations are clearly put, and the work is so arranged that no special mathematical ability is required.

(7) The absence of spherical trigonometry from the ordinary school syllabus is both surprising and unfortunate in view of the practical applications which may be made; nor can this omission be excused on the score of difficulty, since the analysis is scarcely more difficult than that of the corresponding work in plane trigonometry. The explanation, of course, lies in the fact that it is at present excluded from the schedule for university scholarships. The book before us contains in a rather unduly elaborate form the kind of course which might be incorporated in a school programme. After a preliminary discussion on spherical triangles, the methods for solving right-angled triangles are first explained, and then the general case of oblique-angled triangles is considered. Great care is taken to explain the best way of arranging the work in numerical examples. The concluding chapters of the book give applications to geometry, astronomy, and navigation. Theory is throughout subordinated to practice, and those who require a comprehensive working knowledge of the methods of this subject cannot do better than read through this book.

OUR BOOK SHELF.

L'Évolution de l'Électrochimie. By Prof. W. Ostwald. Translated by E. Philippi. Pp. 266. (Nouvelle Collection scientifique: directeur, Émile Borel.) (Paris: Félix Alcan, 1912.) Price 3.50 francs.

THE evolution of electrochemistry affords probably one of the most interesting chapters in the history of the progress of chemical knowledge. Since the birth of this branch of chemistry may be regarded as dating from the discovery of so-called voltaic electricity, the period covered by its history is limited to a little more than a century. The comparative shortness of this period has certain obvious advantages, and the many discoveries of fundamental importance made by investigators in the field of electrochemistry, as well as the development of theoretical knowledge relating to the nature of and connection between electrical and chemical energy afford particularly attractive material for an historical study.

The account presented by Prof. Ostwald, who may be legitimately regarded as the greatest authority on the subject, is admirable in every way, and a more fascinating description of the development of a branch of science cannot well be imagined. The subject-matter and mode of treatment is indicated sufficiently by the titles of the sections into which the text is divided, viz.: (1) introduction; (2) prehistory; (3) Galvani and Volta; (4) Ritter and Davy; (5) from Faraday and Daniell to Hittorf and Kohlrausch; (6) electromotive forces; (7) the beginning of technical electrochemistry; (8) van 't Hoff and Arrhenius; (9) the ionists; (10) modern electrochemical industry; (11) the electron. In this final chapter a very brief but well-written account is given of the results attained in the investigation of the conductivity and the ionisation of gases, which results have given so much impetus to the development of the electron theory.

Much of the material collected and condensed in this little volume is to be found in Ostwald's compendious treatise on "Elektrochemie," published in 1896. This book, largely on account of its size, is comparatively little known amongst students of physical chemistry, and the appearance of a smaller work is therefore in itself an event of some importance.

The Life and Love of the Insect. By J. H. Fabre. Translated by A. T. de Mattos. Pp. x+262. (London: A. and C. Black, 1911.) Price 5*s*. net.

SEVERAL translators have already drawn from the abundant well of Fabre's entomological studies, and the volume before us is a pleasant addition. We like the grateful tribute to the veteran which the preface pays, and the quotation from Maeterlinck in regard to this "Insects' Homer," "who is one of the most profound and inventive scholars and also one of the purest writers, and, I was going to add, one of the finest poets of the century that is just past."

The book tells us of the sacred scarabee supremely inspired by the instinct of maternity to wonderful industry and not less wonderful art; of the Spanish Copris which kneads a large loaf and divides it into pills, one for each egg; of the common dung-beetles (Geotrupes), who belong to the public health service, and are often deservedly decorated; of *Minotaurus typhaeus*, a black beetle of the sheep's pasturage, who burrows and bakes, and even makes sausages; of the ringed Calicurgus, which first stings its captured spider in the mouth, paralysing the poison fangs, and then, safe from being bitten, drives in its poisoned needle with perfect precision at the thinnest part of the spider's cuticle between the fourth pair of legs; of the leaf-rolling Rhynchites, which spends the whole day in making an inch-long cigar with eggs between the layers of the scroll; and of the mother of the Halictus bee family, who becomes in her old age the portress of the establishment, shutting the door with her bald head when strangers arrive, opening it by drawing aside when any member of the household appears on the scene. And so the stories run, full of dramatic situations and romantic interest. We know not which to admire the more, Fabre's style or his eyes. The translator has given us a fine rendering, which reads like the original.

(1) *Aids to Bacteriology.* By C. G. Moor and Wm. Partridge. Second edition. Pp. viii+240. (London: Baillière, Tindall, and Cox, 1911.) Price 3*s*. 6*d*. net. Paper, 3*s*.

(2) *Aids to Pathology.* By Dr. H. Campbell. Second edition. Pp. viii+228. (London: Baillière, Tindall, and Cox, 1911.) Price 3*s*. 6*d*. net.

THESE two little books contain a large amount of information in a small space. Neither professes to be more than an outline of the subject of which it treats, but both seem to be successful in their aim—that of acting as epitomes for the student and practitioner.

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